

## SYLLABUS Fall 2015

### Physical Basis of Global Warming SIO 117

Instructor: Ralph Keeling (rkeeling@ucsd.edu, 534-7582)

Lecture:

MWF 3:00-3:50 p.m. HSS 1305

Office Hours: Thursdays, 3:30-5:00 312 Vaughan Hall

Discussion (not every week, TBD):

Wed. 4:00-4:50 HSS 1128A

Course Prerequisites: Math 20D and Phys. 2C or consent of instructor

Relevant Texts:

David Archer, Global Warming, Understanding the Forecast, Blackwell, 2007

David Neelin, Climate Change and Climate Modeling, Cambridge University Press 2011

Course material downloads, including lecture notes and problem sets: [ted.ucsd.edu](http://ted.ucsd.edu)

Problem Sets will be given out roughly weekly, typically due on Friday.

Grading: Problem Sets 25%, Midterm 25%, Final 50%

		Reading
Sep 25	1. Introduction	(Neelin, 1.1-1.4,1.6)
Sep 28	2. Elements of climate system	Archer 1, Neelin 2.1, 2.4, 2.5.1, 2.6
Sep 30	3. Planetary energy balance	Archer 2, 3 (Neelin 2.2-2.3)
Oct 2	4. Molecular Structure, IR spectra	Archer 4
Oct 5	5. Radiative transfer	
Oct 7	5. - continued	
Oct 9	6. Vertical structure, hydrostatic balance, etc.	Archer 5 (Neelin 3.1, 3.2, 3.3)
Oct 12	7. Vertical transport and convection	Archer 5 (Neelin, 2.3, 3.5, 3.6, 5.3.2, 5.3.3)
Oct 14	7. - continued	
Oct 16	8. Horizontal momentum equation	Archer 6, Neelin 3.1, 3.2, 3.3, 3.4.4
Oct 19	9. Thermal wind, baroclinic instability	
Oct 21	9. - continued	
Oct 23	10. Climate models	Neelin 5.1, 5.4-5.6
Oct 26	10. continued	
Oct 28	11. Refinements to layer model	Neelin 6.1-6.2
Oct 30	MIDTERM	
Nov 2	11. - continued	
Nov 4	12. Climate sensitivity and radiative forcing	Neelin 6.1-6.2
Nov 6	13. Climate feedbacks	Archer 7, Neelin 6.3-6.7
Nov 9	13. - continued	
Nov 11	VETERAN'S DAY	
Nov 13	14. Transient climate response	Neelin 6.8
Nov 16	14. - continued	
Nov 18	15. Greenhouse gas controls	Archer 8
Nov 20	16. The carbon cycle and CO <sub>2</sub>	Archer 9, 10 (Neelin 2.8)
Nov 23	16. -continued	
Nov 25	17. Observed climate changes	Archer 11 (Neelin 7.6)
Nov 27	THANKSGIVING HOLIDAY	
Nov 30	17. - Continued	
Dec 2	18. Model projections and consequences	Archer 12 (Neelin 7.7)
Dec 4	18. -continued	
Dec 11	FINAL EXAM 3:00-5:59 pm Location TBA	